

SARDINE (*Sardinella sp.*) QUALITY BASED ON ORGANOLEPTIC TESTS IN ATAPUPU WATERS, BELU REGENCY, EAST NUSA TENGGARA

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ABSTRACT

One of the fish handling techniques needed to maintain fish freshness is the cold chain application. Cold chain system is very important to be applied in the post-catch handling process to extend the fish rigor mortis phase. Fishermen and fishmongers are people who play an important role in maintaining fish freshness. The purpose of this study was to determine the fresh sardine organoleptic quality after catching until reaching consumers or initial selling. The method used is a survey method through on board direct fish handling activity observation conducted by fishermen and fishmongers at selling locations, as well as fish organoleptic tests using score sheets for fresh fish with observations based on transit time starting from fishing vessel after catching, collectors, fishmongers to the first consumers. Organoleptic quality measurement of sardine taken from fishmongers in Atapupu waters showed that sardine quality fitted for consumption with an organoleptic value of >7.

Keywords: Fish Freshness, Organoleptic Test, Post-catch handling process, Sardine (*Sardinella sp.*)

INTRODUCTION

Atapupu waters is part of Belu Regency area and is directly bordering with Democratic Republic of Timor-Leste (RDTL). Atapupu waters has a fairly high pelagic fish productivity, including small pelagic fish (BPS NTT, 2018). East Nusa Tenggara Province Capture fisheries statistics in 2018 shows that there are 13 small pelagic fish species that contribute to total marine fish

production in Belu Regency. One small pelagic fish species that is dominantly caught and contributes around 50% of small pelagic fishery production is sardine (*Sardinella sp.*).

This fish is the catch target fish of local fishermen and dominantly sold by fishermen in Belu Regency. However, the lack of understanding of fishermen regarding catch handling often results in

fish being sold in rotten conditions. Sardine (*Sardinella* sp) is a fish species prone to spoilage which can be caused by high temperatures thus rapid quality deterioration occurs in just 8 hours after catching and landing (Deni, 2015 and Husma et al., 2019).

In addition, internal factors that cause decomposition are microorganism presence originating from the fish body itself such as bacteria and enzymes. While external factors are contamination and oxidation that can occur simultaneously. Fish mortality occurs as a result of difficult stages in each fishing technique, while rough handling methods cause fish injured, shorten the shelf life and reduce quality (Reo, 2010). Fish freshness is a very important factor and closely related to fish quality. The fish freshness level can be identified physically, chemically, biologically and organoleptically.

Based on organoleptic test, fish freshness can be determined through the observation of eyes, gills, body surface mucus, flesh, smell and texture appearance. Fresh fish characteristics include clear eyes, clear cornea, black pupils, convex eyes, fresh red gills, elastic and brightly colored flesh,

and if the fish are pressed it does not cause permanent scars (Suprayitno, 2020). However, if the fish quality has decreased or they are not fresh, the fish will emit a distinctive fish aroma.

The purpose of this study was to determine fish freshness level from post-catch to consumers' hands qualitatively and quantitatively. The study results are expected to be able to increase fishermen and consumers knowledge in Atapupu waters, Belu Regency.

MATERIALS AND METHODS

Materials and tools

Materials used in this study was sardine fish samples (*Sardinella* sp.) collected from 2 sites, namely from fishing boat and final fish marketing place in Atapupu, Belu Regency, East Nusa Tenggara Province. The tool used is the organoleptic score sheet.

Research methods

The research method used is a field survey method to observe fish post-catch and at marketing site handling techniques, and sensory quality analysis by referring to the fresh fish organoleptic score sheet which consists of: appearance (eyes, gills, and body surface mucus), smell and

consistency/texture (meat and stomach and consistency) (SNI 01-2729.1-2006). Organoleptic test was conducted by 5 panelists. The use of this panelist is included in the limited panelist category, a limited panel consisting of 3-5 people who have high sensitivity so that bias is avoided. These panelists are well acquainted with the factors in organoleptic assessment and know the processing methods and the effect of raw materials on the final product. Decisions are taken by discussion among its members.

Research procedures

The study was started by observing random sardine fish samples in fishing boat and at final marketing places. The observed parameters were organoleptic at three observation sites, namely in fishing boat shortly after the fish died, at fish marketing sites after fish landing and after the fish reached the consumers. The time calculation was recorded after the dead fish reached the consumers' hands or was referred to as transit time. Organoleptic score filling sheet was done every transit time.

Sensory Tests from Limited Panelists

Sensory quality analysis with reference to (SNI 01-2729.1-2006) the organoleptic score sheet of fresh fish includes: appearance (eyes, gills, and body surface mucus), smell and consistency/texture (flesh, stomach, and consistency).

Data analysis

Research data were analyzed descriptively and displayed in tables. In this study, three repetitions were used which are summarized in Table 1.

Time and place

This research was conducted in November 2022. This research activities basically consisted of sardine fish (*Sardinella* sp) sample collections from 2 places, namely from fishing boat and at final fish marketing place in Atapupu, Belu Regency, East Nusa Tenggara Province.

RESULTS AND DISCUSSION

On Board Fish Handling to the Final Fish Marketing Place

Based on survey results and field observations, it is known that fish handling conducted by fishermen and fishmongers consists of several stages, namely:

On Board Fish Handling

Fish that have been caught using gill nets are released and stacked on the fishing boat, then the fish are sorted according to type and size. The sorted fish was only put in a plastic bucket without ice addition.

Fish Storage

After fish landing, the first step conducted by fishermen and fish collectors was to put the fish in a bucket filled with sea water. Based on their experience, soaking fish in sea water does not damage fish quickly, this is in contrast to fish which are immersed in fresh water. The next step was fish collection conducted by the fishmongers. Fish that had been sold in the market were given ice cubes with a ratio of 1:5, meaning 1 kg ice cubes for 5 kg sardine fish. Fish handling conducted by fishmongers had not been focused on importance of cold chain application during fish selling, where ice cubes used were in a small amount. Metusalach et al., (2012) stated that ideal ice and sold fish ratio during the fish selling is 1:1 ratio meaning 1 kg ice for 1 kg fish thus the fish temperature can be maintained at 0 °C up to the final fish selling. This is also

supported by the statement of Sitakar et al., (2016) that refrigeration is a low-temperature preservation process that can extend the fish shelf life.

On Board fresh Fish Organoleptic Tests to Final Selling Sites

Fresh fish are fish that still have the same characteristics as live fish such as appearance, smell, taste and texture. According to Adawyah (2007), one of the parameters to determine fish freshness is organoleptic assessment. Based on fresh fish specification, it has been explained in SNI 01-2729.1-2006 concerning the appearance of eyes, gills, body surface mucus, flesh (color and appearance), meat smell and texture. The value obtained in the organoleptic test is 8-9 then it is included in the very fresh category, 7 means fresh, and below 7 means not fresh. Freshness level observation results of sardine fish which were observed organoleptically based on fish marketing chain starting from post-captured fish on fishing boat, collectors, fishmonger to consumers were shown in Table 1.

Table 1. Average Organoleptic Values of Fish Samples Based on Transit Time

| Observed parts | Organoleptic Values | | | |
|----------------|----------------------|-------------------------|---------------------|-------------------|
| | Fishing Boat (09.44) | Fish Collectors (09.44) | Fishmongers (10.14) | Consumers (13.56) |
| Eyes | 9 | 9 | 9 | 7 |
| Gills | 9 | 9 | 9 | 7 |
| Mucus | 9 | 9 | 9 | 8 |
| Meat | 9 | 9 | 9 | 7 |
| Smell | 9 | 9 | 9 | 7 |
| Texture | 9 | 9 | 9 | 7 |

Eyes

Eyes are the main freshness indicator seen by consumers when buying fish in the market. According to Pariansyah et al., (2018) one of the fish body parts most often used as a fish freshness parameter is eye appearance. Based on organoleptic assessment results, average sardine eye appearance from post-catching on fishing boat to consumers' hands (09.44 – 13.56) ranges from 7 to 9. The observation results indicated that sardine fish was still categorized fresh because fish eyeballs still protruded, pupils were glossy black in color, and the cornea membranes were still clear. Eye appearance was consistent with observations conducted by Widiastuti (2007) which stated that fresh fish have bright eye appearance, protruding (convex) eyeballs, and white corneas. Such condition

was due to the fact that not many biochemical changes had occurred thus fish body metabolism still functioned perfectly. In addition, time interval during transit to consumers' hands was relatively fast thus consumers could still get fish in the fresh category. Sardine fish eye appearance observation in this study still meet the organoleptic value requirements set by SNI (2729-2006), namely 7. A decrease in quality will increase if the fish being traded has not sold well because the cold chain that applies in the market does not comply with the conditions for providing ice.

Gills

One of the main sources of putrefactive bacteria in fish is the gills. According to Priansyah et al., (2018) gills are parts that contain a lot of blood and it is very easy for putrefactive bacteria growth occurrence.

The decaying process can occur when the bacteria have reached optimal levels. Based on the organoleptic assessment results, sardine fish gill appearance average value from post-capture on fishing boats to consumers (09.44 – 13.56) ranges from 7 to 9. Organoleptic average values proved that fish are still fresh because gills still have bright red color, clean without mucus produced from bacteria, still smell specific. Fish quality decline can be assessed from gill appearance because it is in accordance with gill performance in oxygen absorption from water during respiration thus the gills become a microbial accumulation site. Berhimpon (1993) had confirmed that freshly caught fish contains naturally occurring microbes where the microbes are concentrated in three main parts such as skin surface, gills and stomach contents. Based on study results, it can be stated that sardine fish gills in this study were not contaminated with putrefactive bacteria. This is also supported by the fresh fish quality standard in SNI (2729-2006) that gill appearance still meets the requirements.

Mucus

The fish freshness level can also be determined by observing mucus presence

on fish body surface. If fish body surface is covered with mucus, this indicates a deterioration process in quality or the pre-rigor mortis phase is occurring. Based on organoleptic assessment results, the average mucus appearance value on the sardine body surface from post-catch on fishing boat to consumers' hands (09.44 – 13.56) ranges from 8 to 9. This proves that sardine fish is still in a fresh condition thus microbe growth has not occurred. Junianto (2003) states that fish body mucus that is secreted mostly consists of glucoprotein and this is a place for bacterial growth. Based on the research of Murniyati and Sunarman (2000), mucus release is dying fish natural reaction to unfavorable conditions and mucus amount released reaches 1-2.5% of fish body weight.

Meat

Fish meat is also one of the fish freshness level assessment parameters. Fish meat consists almost entirely of transversely striped meat formed by meat fibers. Based on organoleptic assessment results, sardine fish meat appearance average value from post-catching on fishing boat to consumers' hands (09.44 – 13.56) ranges from 7 to 9. The average organoleptic value on meat

appearance was still classified in the fresh category because texture change had not yet occurred. This was indicated by meat condition which was still dense and supple and it was difficult to tear meat and spine. Based on fresh fish quality standards in SNI (2729-2006) it was stated that sardine fish meat appearance in this study still met fresh fish requirements. Gustini et al., (2014) stated that fish meat texture change to become soft and tender was caused by an autolysis process thus the meat becomes soft and easily detaches from the bones. Fish meat freshness decrease can be caused by the cathepsin enzyme presence in fish meat which plays a role in the quality decrease process (Ladrat et al., 2003). Meat appearance which was classified as fresh in this study was due to a relatively fast selling process thus consumers could still get fresh fish, even though handling was not according to standard such as cold chain application. Low temperature application in post-capture fish handling process is an appropriate and right way in inhibiting the fish quality decline (Syafitri et al., 2016).

Texture

Texture is one of the factors that influence consumer food product preferences.

Texture is a group of physical properties consisting of food structural elements that can be felt (Purnomo, 1995). Based on organoleptic assessment results, the sardine fish texture appearance average value from post-catching on fishing boat to consumers' hands (09.44 – 13.56) ranges from 7 to 9. Andayani et al., (2014) states that a good food texture is fresh, not mushy and slimy. In this study, the texture appearance has met the requirements according to SNI (2729-2006). This proves that sardine fish condition being traded was still suitable for consumption. The sardine fish texture condition was still good because time interval from post-caught fish to consumers is relatively short, even though cold chain implementation is not based on standard. Rully (2010) states that after the fish are caught there will be physical and chemical changes thus it can be inhibited by low temperature treatment. If low temperature treatment is not applied, fish that are not sold quickly will experience a rapid quality decline. This is caused by meat muscle tissue changes in the enzymatic process, where the blood circulation that carries oxygen for metabolism stops. Pradana (2008) states that in the final decomposition stages, fish

muscles relax again and lose their elastic properties (post-rigor phase) due to uncontrolled bacterial and enzyme activities causing fish muscle protein degradation.

Smell

Smell is an easy-to-use parameter that determines fish freshness, especially when buying fish on the market. According to Junianto (2003), the factor that causes fish to quickly smell bad is low glycogen levels thus the rigor mortis process takes place more quickly. Putrefactive bacteria activity in decomposing fat and protein produces unwanted compounds such as ammonia, indole, and H₂S causing bad smells and an unpleasant fish taste. Based on organoleptic assessment results, sardine fish smell occurrence average value from post-catch on fishing boat to consumers' hands (09.44 – 13.56) ranges from 7 to 9. This assessment met the requirements in the fresh fish quality standard based on SNI (2729-2006) thus the sardine fish in this study were suitable for consumption. Even so, study organoleptic assessment was decreasing, this is possible because bacteria have started to multiply causing protein breakdown process conducted by microbe enzymes.

CONCLUSION

The sardine fish organoleptic quality landed in Atapupu at 09.44 until the selling process occurrence at 13.56 WITA still showed fresh conditions fit for consumption with organoleptic values > 7 even though cold chain application was not in accordance with good and correct procedures.

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